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CONTENTS.

	PAGE
ADVERTISEMENTS	1
INDEX OF APPLICATIONS FOR PATENTS	1
GADSDEN'S PATENT BICYCLE TROUSERS	3
REVIEWS—	
Draper's Memoirs	4
Little Dorinda	4
Buckley's Fairyland of Science	4
EDGE'S TRAMWAYS	4
GAS A SUBSTITUTE FOR SOLID FUEL	4
CHEMICAL MEMORANDA	5
MR. BESSEMER ON PATENT RIGHTS	5
A STEAM JURYMAN	6
THE THERMOCLINIUM	6
MANUFACTURING INTERESTS IN GERMANY	6
THE GREAT PYRAMID	6
CADETT'S IMPROVEMENTS IN PHOTOGRAPHIC APPARATUS	6
A NEW YORK EXHIBITION	7
GREENFIELD'S RAILWAY SLEEPERS	7
LOCOMOTIVES FOR AUSTRALIA	7
RAILWAY WORK IN JAPAN	7
PROCEEDINGS OF THE INSTITUTE	8
MONTHLY NOTICES	8
THE INVENTORS' DINNER	9
A NEW FOOT POWDER	11
PROCEEDINGS OF SOCIETIES—	
Royal Society	11
Entomological Society	11
Statistical Society	11
Mathematical Society	12
Physical Society	12
Historical Society	12
Anthropological Institute	12
Geographical Society	13
Geological Society	13
Society of Biblical Archæology	13
Numismatic Society	13
Chemical Society	13
Photographic Society	13
Meteorological Society	13
Microscopical Society	13
Linnean Society	14

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Railways, Carriages, Coupling, Uncoupling and Altering Position of Carriages and Engines.—J. C. Mewburn (com.), 4744. E. P. Alexander (com.), 4828. A. Budenberg (com.), 4846. H. Dalziel and A. Craig, 4977. G. A. Williams, 5121.

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Thrashing Machines.—F. and W. Nalder, 4738.

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Waterclosets, &c.—S. S. Hellyer, 4913. H. S. T. Goodson, 4958. H. S. Snell, 5013.

Waterwheels and Engines, &c.—E. B. Ellington, 4759. G. S. Hill, 4829. J. Stannah 4967.

Waterproofing, &c.—R. H. Greenleaves, 4848. S. Nelis, 5055. W. R. Lake (com.), 5102.

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Weighing Machines, Scales, Indicating Weight. E. H. Tooley, 4963.

Wheels for Carriages, &c.—H. Dalziel and A. Craig, 4977. W. H. Kitson, 5064.

Window Blinds, &c.—W. E. Gedge (com.), 5221.

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Woods and Veneers, &c.—J. H. Isitt, 4842. F. Winterhoff, 5098.

*** The above List is prepared from the Paten Records by Mr. T. Morgan, Secretary of the Inventors' Patentright Association, Limited.*

GADSDEN'S PATENT BICYCLE TROUSERS.

This invention consists in the application of an elastic band or thread placed in the overlapping part of the trousers, with an enlarged portion which may be metal, but preferably the rubber is enlarged in size. This rests when the trousers is in the ordinary shape on the inside of the bottom of the trousers. To draw the trousers tight they are first doubled back as required, and the enlarged part is pulled, drawing the trousers tight, the enlarged part being placed under the boot and shoe, and held there.

Reviews.

DRAPER'S MEMOIRS.

"Scientific Memoirs." By J. W. Draper, M.D., LL.D. London: Sampson Low and Co.

This is a very interesting work, having reference to experience and observation in regard to radiant energy. Most of these works are only abridgments and condensations of articles which appeared in American scientific journals. One of the objects of republication is to set forth Dr. Draper's claims to be considered as one of the earliest contributors to our present knowledge of radiant energy. The work contains many hints and suggestions for further inquiry, and we may quote the following as containing statements of much interest:—

"If on such a surface (*i.e.*, a metal plate, covered with gum, and then dusted over with finely powdered phosphorus) a key or other opaque object be laid, and it then be exposed for a moment to daylight, on carrying it into a dark room and removing the key a spectral shadow will be seen depicted in black, and its contour marked out by the brilliantly glowing phosphorus surrounding it. After continuing to shine for some minutes, the light gradually fades, and finally becomes extinct. If, this having been accomplished, the phosphorized plate be put away in a box or drawer where not a ray of light can reach it, and kept therein for days or even weeks, on exposing it in a dark room, on a plate of warm metal, the phantom shadow will emerge, perhaps even more strongly than at first."

LITTLE DORINDA.

"Little Dorinda: Who Won and Who Lost her!" by Percy Fitzgerald, M.A., F.S.A., author of "Never Forgotten," "Second Mrs. Tillotson," "School Days at Saxonhurst," "Bella Donna," "75, Brook Street," "Diana Gay," &c., &c London: 63, Paternoster Row.

This is a pleasing novelette of the domestic romance type, describing how a charming young lady was successfully wooed by a literary barrister she loved, and by parental duress passed over into wedlock with a colonial *riche*, who turns out a jealous madman, and in a desperate encounter between the lover and the husband, gets wounded, and taken to a madhouse, afterwards dies, and the hero marries the heroine, thus winding up everything satisfactorily.

BUCKLEY'S FAIRYLAND OF SCIENCE

"The Fairyland of Science," by Arabella Buckley, authoress of "A Short History of Natural Science," "Botanical Tales for the use of Junior Students," &c. Crown 8vo, cloth gilt, with 74 illustrations. London: Edward Stanford.

This is a book handsomely got up and well illustrated, full of pleasant reading which seeks to inform the young as to prominent points of science. It is, it appears, based on lectures delivered in St. John's Wood last spring; its various headings comprise these:—The Fairyland of Science: How to Enter it; How to Use it; How to Enjoy it—Sunbeams, and the Work they do —The Aerial Ocean in which we Live—A Drop of Water on its Travels—The Two Great Sculptors, Water and Ice—The Voices of Nature, and how we Hear them—The Life of a Primrose—The History of a Piece of Coal—Bees in the Hive—Bees and Flowers.

Mr. William G. Reid, of Rock Hill, S. C., has patented an improved plough. This invention relates to a means for adjusting the standard of a plough nearer to or further from a vertical line, in order to regulate the depth of the furrow.

EDGE'S PATENT GROOVELESS TRAMWAY SYSTEM.

The object of this invention (exhibited in the annexe of the carriage department, British section, Paris Exhibition) is to provide a road-tramway, combining all the advantages of the present system without the danger and inconvenience to ordinary traffic, arising from the grooved rail now in use; the objections to the latter being of such a character as, in many cases, to call forth so much opposition as altogether to prevent on very important routes the introduction of this otherwise most convenient and comfortable means of conveyance.

The rails, which may be of various hollow sections, are provided with a series of equidistant round or oval holes through the top part or plate, the wheels being supplied with corresponding projecting studs of conical shape, either round or oval at their base. These studs are so arranged that as the vehicle travels, they enter the holes on the rails, and thus keep the wheels on the track much more effectually than the flanged wheel and grooved rail now in vogue. This object being secured the rail may be laid perfectly flush or level with the surface of the roadway, and the holes supplying the place of the groove entirely obviates the injurious effects resulting to the wheels of ordinary carriages entering and leaving the grooves of the present tramways. The inventor, in order to prove the correctness of his theory, has laid down about a quarter of mile of line, in the shape of the figure 8, and has had a car expressly built for the purpose of carrying out his experiment. The rails of this experimental line are of cast iron, but steel or rolled iron would probably be better for permanent use. The wheels of the car are of cast steel in one piece, including the projecting studs, but it is obvious that studs of hardened steel may easily be fitted to a wrought-iron or cast steel wheel in such a manner that they may be replaced in case of accident.

Not one of the least disadvantages connected with the present system is the amount of labour involved in keeping the grooves clear from stones, &c., rendering necessary a considerable staff of men being employed in all large towns for this particular purpose. The inventor wishes to point out that in his system the passage of the car itself effectually clears out the holes (which, as before explained, take the place of the groove), and the rail, being level, all other impediments, by a simple operation connected with the car, can be brushed off. It may be thought that stones wedged, either accidentally or purposely, in the holes in the rails might interfere with the passage of the car, but from actual experiment this has been found not to be the case, as the weight of the car itself, even when unloaded, is sufficient to crush any such impediments immediately upon their contact with the steel studs.

It may here be mentioned that for the purpose of receiving the fragments of any such obstacles, and also for the natural accumulation of dirt and dust falling through the holes, the rails are fixed on cast-iron chairs, placed over a hollow foundation, forming a continuous chamber to be connected at intervals with the sewers, and will thus also form a channel for the removal of surface water from the roadway. The rails are so arranged as to be easily unscrewed from the chairs and taken up without in any way disturbing the pavement or foundation, so that, when necessary, the channel underneath can readily be cleared out, although it is confidently believed that such clearance would not be required for many years, as the small size of the holes will not permit any great amount of rubbish to pass through, and what does pass through will in a great measure be flushed away into the sewers.

A very casual inspection of the present tramways will show that the granite or other pavement on each side of the rails is constantly sinking below the level of the rails. This is caused by surface water percolating between the rails and the pavement, which so loosens the foundation as to cause the pavement to settle. The rail, being kept up to its original level by the sleeper or wooden foundation upon which it rests, then forms a dangerous obstruction to ordinary traffic, and the authorities are constantly put to considerable expense in remedying this evil. With reference to this particular matter, the inventor states that (according to his plan) the pavement on each side of the rails rests on the same foundation as the rails themselves, which foundation is not liable to injury from surface water.

It should be borne in mind that though the inconvenience may appear less in the present system when the rails are first laid down (the grooves then being as narrow as practicable), the evil constantly increases as the grooves become necessarily wider from constant wear, and at length become sufficiently wide to admit the wheels of ordinary carriages, causing a severe wrench and frequent accidents when they leave the grooves. Not only is this injurious to such carriages, but it is in an equal degree damaging to the roadway. Owing to the wheels of the carriages being mostly of a different guage to the tramway, the wheels on one side of the carriage travel along the grooves while the other wheels are cutting a rut in the pavement on the side of the opposite rail, thus in course of time completely destroying the pavement and necessitating the relaying of the street. The inventor, in claiming as the result of his invention a perfectly free, unencumbered, and well-drained roadway, contends that the pavement, being equally convenient for use over all parts, will certainly long outlast any pavement where such obstructions exist as those caused by grooves and the consequent interference with the surface drainage of the roadway.

It will be at once apparent to those who give this matter their attention, that a different arrangement of brake to the one generally in use would be necessary in the system here suggested. To meet this necessity the inventor has substituted a screw-action brake which presses against the sides of the tires of the four wheels simultaneously, and as it is obvious that wheels on this system can never slip along the rails, it is possible to stop the car, if required, almost instantaneously.

The inventor and patentee is Mr. C. A. Edge, architect, 21, Bennett's-hill, Birmingham.

GAS A SUBSTITUTE FOR SOLID FUEL.

Mr. M. H. Strong, writing in the *Scientific American*, makes the following pertinent observations on this important subject:—

It is manifest that the transformation of a crude to a gaseous form of fuel by employing it for the decomposition of steam, permits a wider, more varied, and perfect application of its potential heat energy, and that the measure of its economy is the cost of such transformation. Let us in a general way inquire into this question of cost.

No sooner had the discovery been made that water is composed of oxygen and hydrogen gases, than it became a pet theory (and would have remained a theory to this day had not fact taken its place) that it would sooner or later afford a practical source of cheap heat and light. Many thousands of dollars and much thought and labour have been devoted to attempts at its rapid and economical decomposition, but so persistently did the solution of the problem elude experimenters that at one time the term water gas became a synonym for hallucination. Chemical reagents and the electric current were in turn faithfully tried and abandoned as entirely impracticable on the score of economy.

Advantage was then taken of the well known affinity of the oxygen of water for carbon at high temperatures, but unlooked for and apparently insurmountable difficulties of a technical nature interposed to prevent a decided success in that direction, some of which we will mention. The carbon employed, whether of coal, coke, or charcoal, was placed in retorts of clay or iron, set in a furnace and brought to a high temperature by a fire beneath, as in the ordinary distillation of gas coal. Steam was then admitted to the retorts, whereupon the well understood decomposition and recomposition ensued with an evolution of what is termed water gas, composed mostly of hydrogen, carbonic oxide, and carbonic acid gases, the rapidity of the operation being of course in direct proportion to the quantity of carbon and heat employed. This general description will cover nearly all the attempts at water gas manufacture by the agency of carbon up to quite a recent date. In short, experimenters seem to have confined themselves to the system of external heating of retorts. Now let us examine into the defects of the system as heretofore employed, or at least of its indifferent success.

It should be borne in mind that we are not speaking of water gas as a diluent or vehicle to convey rich hydrocarbon gases to the burner for lighting purposes, but solely as a fuel.

First, to impart the necessary heat to the carbon it must be transmitted through a retort, usually made of clay (a decidedly bad conductor), and since the external surface of this retort is small compared with the internal surface of the furnace in which it is placed, but a small fraction of the heat evolved was applied to the carbon itself; add to this loss by conduction through the walls of the furnace the enormous loss of heat due to the imperfect combustion of the fuel, and we recognise the first item of cost.

Second, to maintain the necessary temperature of the carbon for decomposition involved a serious wear and tear of both furnace and retorts.

Third, since speed of manufacture is an element of economy, and since direct contact of the oxygen of the steam with the carbon is absolutely essential to decomposition, we see another item of loss in the fact that although at first the evolution of gas was rapid it soon ceased because contact ceased. This will be explained by stating that the process of decomposition forms a coating of ash over each individual lump or piece of carbon, which soon becomes so protected by the oxidation that much of the steam escapes decomposition, while constantly absorbing useful heat to no useful purpose.

Another and by no means the least item of cost is found in the large volume of carbonic dioxide formed, especially in the lower ranges of temperature. With no method devised for conversion to CO, its action was not simply a diluent, but a directly antagonistic one to the carlorific power of the combustible portion. To be sure, this impurity could be removed by lime or other alkaline reagents, involving, however, an expense almost prohibitory. Last, but not least, was the cost of labour in the charging and discharging of retorts and the stoking of fires.

These disadvantages and drawbacks incident to, in fact inherent to, the system of external heating always have worked and always will work its defeat, if economy be the object sought.

On the principle, however, that with perseverence defeat leads to success, the money, time, and labour have been well spent. By the new system water gas is produced at a cost which guarantees a gratifying improvement over the present wasteful method of generating heat, not alone in the arts and manufactures, but in domestic use.

Reserving for another article the attempt to show the great advantage to be derived in the use of gaseous fuel over the solid form, we will content ourselves in this by endeavouring to point out in a general way, without referring to details of construction, wherein the new method of producing water gas avoids the difficulties encountered in the old.

First, it abandons the external for the internal system of heating, thus effecting a great saving of fuel. Second, it employs the very cheapest form of carbon, that of dust or slack, the use of which is impracticable in the old. Third, the products of imperfect combustion are utilised for the heating of steam, whereas in the old system they were wasted. Fourth, the oxygen of the steam being thus intensely superheated is applied to the carbon in a state of minute subdivision and while in suspension, thereby securing direct and intimate contact of these elements, and as a result astonishingly rapid and thorough decomposition. Fifth, the CO_2 portion of the gas formed by this contact is thoroughly converted to CO by passing through a bed of incandescent carbon before its exit from the generator, by which two very important advantages are gained, to wit, avoiding the labour and cost of purification, and an exchange of one volume of the non combustible CO. Sixth, the great saving in labour and wear and tear.

It must be admitted that these differences are radical, and that they indicate improvement in a wide field of operations.

CHEMICAL MEMORANDA.

We extract the following notices of the proceedings of the Académie des Sciences of November 4th, from the *Chemical News*:

Reciprocal Displacements between Oxygen, Sulphur, and the Halogens Combined with Nitrogen.—M. Berthelot.—According to the quantities of heat liberated chlorine ought to displace bromine and bromine should displace iodine, both in the gaseous hydracids and in those combined with water, which agrees with general experience. Chlorine and bromine ought to displace sulphur in sulphuretted hydrogen, whether gaseous or dissolved, as is shown by experience. The reaction is effected so much the more easily, as an excess of chlorine forms, with the sulphur set at liberty, chloride of sulphur, in the anhydrous state and in presence of water, several secondary compounds. Iodine ought to displace sulphur in dissolved sulphuretted hydrogen, forming dilute hydriodic acid; but, on the other hand, sulphur ought to decompose gaseous hydriodic acid, forming gaseous sulphuretted hydrogen, as actually happens. Oxygen should displace sulphur in sulphuretted hydrogen, gaseous or dissolved. Between chlorine and oxygen the thermic theory indicates the formation of an equilibrium. Oxygen ought also to displace bromine in hydrobromic acid, and iodine in hydriodic acid, both gaseous and dissolved.

Reciprocal Displacements between Weak Acids.—M. Berthelot.—Two feeble acids brought in contact share the base, the partition being regulated by the state of partial decomposition of the two salts, which depends at once on the proportion of water and on that of the corresponding acid.

Reaction between Mercury and Hydrochloric Gas.—M. Berthelot.—13·5 grms. of mercury and 48 c.c. of pure hydrochloric acid gas were placed in a well-sealed tube, and heated as strongly as possible for an hour. Rather more than 1 c.c. of hydrogen was obtained.

Maturation of the Grain of Rye.—A. Müntz.—The saccharine matter existing in the grain of rye appears to be synanthrose, a sugar discovered by M. Pope in the tubers of the Jerusalem artichoke. Synanthrose is not present in wheat, &c.

Dangers of the Industrial Use of Methyl Alcohol.—L. Poincaré.—Animals kept from eight to sixteen months in an atmosphere freely renewed, but charged with the vapour of methylic alcohol, presented during life an abnormal development of the abdomen. On a *post mortem* examination the liver was found greatly enlarged as in a state of fatty degeneration. A similar modification was traced in the muscular fibres of the heart, of the urinary passages, and of a great number of the pulmonary cells. There was also congestion of the nervous centres. The author urges that some other method of preparing alcohol for industrial purposes should be selected.

An Iodised Derivative of Camphor.—A. Haller.—Ths author in order to prepare a cyanogen derivative of camphor treated a benzolic solution of a mixture of iodised camphor and sodic borneol with a solution of iodide of cyanogen in the same hydrocarbon. The compound obtained was $C_{10}H_{13}IO$.

Reproduction of Felspar by Fusion and by Prolonged Exposure to a Temperature Bordering on Fusion.—F. Fouqué and M. Lévy.—The authors melted in a platinum crucible placed in a Schlœsing furnace either natural pulverised felspars or artificial mixtures of their chemical constituents.

Two Specimens of Natural Crystals of Epesomite of Remarkable Dimensions.—P. da Rouville. The crystals were more than a centimetre in length.

MR. BESSEMER ON PATENT RIGHTS.

In a communication to the Industrial Property Congress, lately held in Paris, Mr. Henry Bessemer, the well-known inventor, remarks that our food, our clothing, our light, our homes, with all their thousand luxuries, owe their present character to that indomitable spirit of research and improvement which is characteristic of the present age—a spirit powerfully fostered and deservedly encouraged by those laws which proclaim a personal property in inventions. Without this protection, not merely in the bare idea of some new force or unknown object, but in the development and creation of practical means, based on the new idea, whereby results never before obtained are realised for the benefit and advancement of mankind, Mr. Bessemer has no doubt that the rapid progress which the world has made, and is still making, in arts, sciences, and civilization, would receive a severe check, which would at once stop the avenues to wealth and fame, and would thus dam up the now overflowing stream of human intelligence, bar every road to improvement in the industrial arts, and send us back to those days of superstition and ignorance, from which the light of science has emancipated us.

Yet there are men who oppose all laws securing property in inventions, and whose "retrograde notions" are now being pressed upon upon the world with unwonted force. Who are they? Mr. Bessemer answers:

First. A class of manufacturers whose purely selfish view is to make the most of their present imperfect means of production. Such men, on principle, oppose all change, because it would personally inconvenience them.

Second. The unintelligent, in all positions of society, who have through life dragged their unimaginative existence along in the same rut, and believe in no other than the beaten path which only they are able to tread. Such people are opposed to all novel ideas.

Third. A too numerous class who, while able to appreciate an improvement in their trade, are not honest enough to pay an inventor for the benefit he has conferred on them, and who either openly set him at defiance, or try to escape his just claims by some miserable evasion of the law; but having been convicted in so doing, have had to pay heavy damages to the persons they have wronged. It is this class of opponents who cry out most loudly against the patent laws.

Doubtless, adds Mr. Bessemer, there are also some honest and honourable men who oppose patents conscientiously, and simply because they believe them to be injurious to the public interests; but this is a very small class, and is composed chiefly of persons having no real practical knowledge of the question, either in its scientific or commercial bearings.

It would be impossible to state more patly and compactly the composition of the anti-patent forces; and it would be well to test the motives of those who shall again assail our patent system by the fact noted under the third classification.

A STEAM JURYMAN.

The other day a summons, commanding Thatcher Magoin to present himself for service in the jury box was returned to the Commissioner of Jurors with the information that it had been served upon the wrong party. The Commissioner said to the bearer :—

"That settles it as far as you are concerned, but Magoin must come here and show cause why he should not be a juror."

"He can't," was the reply, "he's too busy. If he did come he would make things hot for you, Besides, you would have to send a derrick and a truck to bring him. He turns the scales at 5,000lbs."

The Commissioner was incredulous; worse, he made remarks not complimentary to the speaker's condition with respect to sobriety. Then the summoned man explained.

"I am telling you facts, Mr. Commissioner," he said. "Thatcher Magoin is a steam engine, and is located at the foot of Fletcher-street. I am Nicholas Morris, stevedore. Years ago I was employed by a man named Thatcher Magoin. I named my engine on pier 19, East River, after him. When the Directory man came to the dock to get names he saw the name of Thatcher Magoin on the engine, and thinking he was the boss, put it in the book. You'll see it page 949.'

This, we believe, is the first time that a steam engine has been called to do political duty. There appears to be no reason, however, why a well conducted or well constructed piece of machinery, with a phonographic metric attachment, should not be able to hear and weigh evidence quite as efficiently as the average jury.—*Scientific American.*

THE THERMOCLINIUM.

The Thermoclinium is triangular in shape like the ancient warming-pan, from which it derives its name, and like many valuable inventions is simple in construction. It is manufactured from the best merino red flannel; and contains a layer of medicated cotton-wool between its upper and under quilted surfaces.

It is light and comfortable in use; and is planned for preventing the escape of the natural heat of the system, and no way incommoding, or causing uneasiness to the wearer. It is secured round the waist by a band and buckle, and the lower portion, passing between the legs from before backwards, is connected by an elastic loop with the waistband in such a manner that all the operations of nature can be easily performed without interfering with the due adjustment of the Protector. There are various modifications of the shape and fastenings to suit the many cases in which the Thermoclinium will be found beneficial and useful.

It is designed to relieve persons suffering from cramps, abdominal pains, indigestion, and diarrhœa, the effects of cold, &c. Ladies requiring local warmth during certain periods and pregnancy. Children, and those suffering from various forms of intestinal and mesenteric dieases, and all in any station of life, who, from the nature of their occupation or calling, are exposed to cold and damp.

Mr. J. Breitbart, 343, Edgware Road, is the Inventor.

CONDITION OF MANUFACTURING INTERESTS IN GERMANY.

The Chamber of Commerce and Industry of Stuttgart has published its yearly report. From this elaborate and useful publication we condense the following statements concerning different industrial branches.

In regard to the manufacture of artificial alizarine, the consumption of the same is stated as exceeding by 50 per cent. the largest quantity of the natural article ever produced, amounting to 50,000 pounds of 10 per cent. past a day. Alizarine is to-day by far cheaper than that article ever was while solely manufactured from the root. An advance of 100 per cent. on the present price, however, would hardly cause a decrease in consumption.

Sixteen factories, employing 390 men and furnishing about 2,000 pianos a year, are at present devoted to that branch of industry at Stuttgart. Besides, there are four establishments manufacturing the mechanisms, employing sixty hands. There are also four manufacturers of parlour organs, employing 112 men and furnishing about 1,600 instruments a year. Business has been reported as very good for the past year, especially as to exportations to Chili, Brazil, and the island of Java are concerned.

The reports from the iron districts are discouraging. Consumption has, on one hand, decreased considerably, while the opposition made by England, Belgium, France, and America has been growing continually. High taxes, high prices of coal and a lack of skilful and experienced workmen prove a serious obstacle in the way of a prosperous development of the German iron interests.

The manufacturers of German silver and silver plated ware report an improvement in the condition of trade compared with last year. They attribute a great influence in this direction to the protection offered to the manufacturer in devising and offering new designs, by the new trade mark clause of the German patent law.

A reaction of the present deplorable condition of business matters in the United States is shown in the dulness existing in the exportation and manufacture of corsets and linen goods throughout Geamany. The gross value of corsets manufactured has decreased consiberably, from 10 to 25 per cent. having been estimated. England's purchases alone, as an exception, amounted to about 10 per cent. more this year than the year previous.

The manufacture of clothing has, in spite of the decrease caused by the opposition of the United States in South American markets, increased considerably. Prices are, however, very much depressed.

The shoe and leather manufacture is threatened with total extinction by the opposition made by the United States. America furnishes a better article at a lower price than it can be produced in Germany. Unless the German Government creates a high protective tariff on hides, leather, and manufactured goods, Germany will for the future be unable to compete with American goods in its own markets. Austria even makes quite an opposition in the shoe line in Germany, as wages are much lower there than in the German empire.

THE GREAT PYRAMID.

Following up the views as to the astronomical significance of the construction of the Great Pyramid, the *Kansas* (*U.S.*) *City Review of Science and Industry* has, in its November issue, a third article, by Rev. James French, of Denver, Colorado. The article, which ably vindicates the writer's theory of this stupendous structure, will be best understood from the following quotation:—"Here is a structure situated among idolaters and built by idolaters. Their other monuments are all covered over with symbols of their idolatrous forms of worship. But this one contains no allusion to any religion except Judaism and Christianity. What does this wonderful fact mean? Herodotus obtained from Egyptian priests a tradition that King Cheops suspended idol worship, closed the idol temples, and forbade the offering of sacrifices to idol gods, during the erection of his pyramid. The reason suggested by some why Cheops was not buried there, was, that he so incensed the idolatrous natives by his prohibition of idol worship, during the erection of the pyramid, that they would not permit it. Now, if it be asked what reason we can give for using one inch to a mile rather than ten to one hundred, in these measures, we answer: First, because it fits; secondly, it is the measure which we have shown was used before on this level. The distance around the pyramid on this fiftieth course of masonry is 25,827 inches. The circle described by using the vertical height from this point as a radius is, in length, 25,827 inches. This is the number of years that the pyramid's governing star, Alcyone, will be in performing its grand cycle on the ecliptic, twenty-five thousand eight hundred and twenty-seven years. We have never examined the symbol in the internal arrangements of the pyramid of Cheops, bearing on Chronology. There are others which we must defer till another time. We are aware of the liability to interpret erroneously this kind of language; we may think we find symbols where there are only coincidences."

CADETT'S IMPROVEMENTS IN PHOTOGRAPHIC APPARATUS.

This invention has for its object the application of pneumatics for photographic purposes, so that the lens, by means of a shutter or other covering, is uncapped or exposed at will, according as required.

To a portion of the apparatus holding the lens, a case or box is screwed which contains a bellows or case acted on by spring or otherwise, the said bellows being in communication with a pipe or opening into the pneumatic tubing. On a spindle acting on or by the said bellows is fitted or secured a shutter which projects beyond the said case or box.

The action is as follows: By pressing an air or gas chamber in communication with the tubing, the bellows or case fitted or secured to the apparatus is actuated, and the shutter or cap is moved so as to uncap or expose the lens as required. The bellows, disc, or chamber can be fitted to the photographic apparatus without a case, and springs applied thereto may, as is evident, be sometimes dispensed with, though springs are preferred to be used. A locking arrangement is generally used which holds the shuttle or cap, so as to get the proper focus.

Mr. Armondos Frank, of Howell, Mich., has patented an improved hay fork that takes the load of hay or grain with great facility, and retains the same during the time the fork is travelling to the point where load is to be deposited, the tines being then opened in convenient manner, and the fork returned to the place of charging.

AN INTERNATIONAL EXHIBITION IN NEW YORK.

A NUMEROUSLY attended meeting was held in New York on October 31st, for the purpose of initiating a movement for a world's fair to be held in New York in 1889. As expressed by the call, which was signed by many prominent manufacturers and commercial firms, the object of the meeting was, in full, to consider the propriety of suggesting to the mayor of New York that delegates from all the States be invited to assemble in that city on the 30th of April next, that being the ninetieth anniversary of the inauguration of Washington as the first President of the United States, and the establishment of constitutional government, in order that the proposition to hold a great exhibition of the industry of all nations in the city of New York, in the centennial year of that event (1889), or sooner, might be maturely considered.

At the meeting it was unanimously resolved, "That there be appointed an executive committee of ten, with power to add to their number, who shall take into consideration the subject for which this meeting was called, to determine when a National World's Fair shall be held in the city of New York, and authorising such committee to take such action in the matter as shall be deemed advisable."—*Scientific American.*

GREENFIELD'S IMPROVED COMBINED CHAIR AND SLEEPER FOR RAILWAYS, &c.

THE object of this invention consists of a combined chair and sleeper for the permanent way of railways or tramways, so formed that when laid there is no necessity for guaging, as the chair and sleeper are cast in one piece to the guage required ; and, further, the sleeper's strength is so proportioned as to prevent the slipping that usually takes place in permanent way as now constructed.

ARSENIC IN SULPHURIC ACID PYRITES.

IN Spanish pyrities, M. E. Hjelt, using A. Smith's method, finds 0·91 per cent of arsenic ; in Westphalian, 0·30 ; and in Norwegian, mere traces. In chamber acid he finds 0·202 of arsenic ; in the acid from Glover's tower, 0·331 ; and in that from Gay-Lussac's condenser, 0·334. The bulk of this arsenic is present as arsenious acid. In the last chamber the acid contains merely 0·019 per cent of arsenic. The mud deposited in Glover's towers consists chiefly of arsenious acid.

AMERICAN LOCOMOTIVES FOR AUSTRALIA.

THE Baldwin Locomotive Works, of Philadelphia, has lately shipped to Australia, by the clipper ship Colorado, from New York, three powerful locomotives for Sydney, New South Wales, where they will be used on the railways owned by the Australian Government. The shipment comprises one passenger locomotive and two freight locomotives. The passenger locomotive has cylinders 18 inches by 24 inches, four driving wheels 63 inches in diameter, and a four-wheeled swinging bolster truck, with wheels 30 inches in diameter. The tender is on four wheeled trucks, in accordance with the usual American practice. All the truck wheels are steel tired. The two freight locomotives are of the "consolidation" type. These engines are of the largest and most powerful freight locomotives constructed. They weigh in working order, exclusive of tender, 102,000 pounds each. Their dimensions are: Cylinders, 20 inches by 24 inches ; they have eight driving wheels, four feet in diameter. On one occasion, on the Susquehanna Division of the Northern Central Railway, where the grades are very light, one of these engines drew a train of 160 empty cars. The total length of the train was one mile. The usual work of engines on that division of the road is from ninety to one hundred loaded cars each trip.

RAILWAY WORK IN JAPAN.

By Mr. W. FURNISS POTTER, M. Inst. C.E.

THERE are at present 66½ miles of railways in Japan, 142¾ miles laid out, with working plans, sections, and estimates completed, and 455 miles projected, the general route only having been examined and decided upon. The earthworks of the existing lines are made for a double way, and the bridges for a single way. The permanent way is of double-headed 60lb. rails on the Yeddo-Yokohama and Kobe-Osaka lines ; but on the Osaka-Kioto line, 60lb. flat-bottomed rails on cross sleepers are used. The superstructure of the smaller bridges was originally of timber, but has been renewed with iron. The larger bridges are all of the Warren girder type, and as a rule of 100 feet spans. The foundations are on brick wells 12 feet in diameter, and on an average about 60 feet deep. Native examples of engineering were chiefly remarkable for their temporary character. The usual foundation for the largest buildings is only a few stones on the surface of the ground. The natives are very clever in making artesian borings for water. The workmen are extremely intelligent and industrious, especially the carpenters, who are by far the most numerous and skilful. The wages of first-class carpenters are 1s. 8d. per day ; of blacksmiths, 1s. 6d. ; of bricklayers and masons, 1s. 5d. ; and of coolies, 11d. Materials found in the country for construction are not very good, except timber, which is abundant. No limestone possessing hydraulic properties has been found. It is impossible to furnish any reliable information as to the cost of the works, as the Japanese officials avoid giving particulars on this point to the foreign staff. The chief engineering difficulty in Japan is the treatment of the watershed. The beds of the rivers are nearly all higher than the surrounding country, varying from a few feet to forty feet or more. In some instances the railway has been taken under the rivers by tunnelling. As a rule, however, the rivers were bridged over, and approached by steep gradients and high embankments. The flood waters are confined in the rivers by huge banks gradually built up by the natives, as the beds of the river became silted up, and were frequently formidable works. The general character of the country was a series of highly-cultivated and well-watered plains, bounded by ranges of hills of the metamorphic formation. Where these hills had to be crossed there would be some heavy works. The traffic on the railways already constructed was considerable, and it is estimated that on future railways the passenger traffic alone would pay a dividend of 7 per cent. Not much had been done in goods traffic, as the existing lines are in competition with the water communications. In the future development of railway work in Japan, two essential points are necessary, greater economy of construction, and the introduction of English capital and enterprise. These could be obtained if the principle of surface lines were adopted, and the natural jealousy of the government of foreign interference were abolished.—[Abridgment of paper read at the Institution of Civil Engineers.]

Mr. Nelson E. Allen, of Beaver Dam. Wis., has patented an improved sheep rack, from which the unconsumed feed or hay which the stock will not eat may be discharged by tilting one or both of the racks proper. The racks may be so placed as to exclude sheep and other stock from the trough while grain is being placed in it.

IN MEMORY OF
THE PRINCESS ALICE.

Thy spirit 's gone to its sweet rest,
Fond daughter of the regal west,
A jewel fair !
Gone, in the summer of thy prime,
To join in spheres of love sublime,
Thy father there !

In memory of our noble prince
We mourn thee more ; so cherished since
Thy gentle eyes
Watched, dove-like, till th' immortal guide
Breathed out his soul, and drew aside
The precious prize !

The world is weeping o'er thy bier—
If sorrow's tears have power to cheer
Our widowed Queen ;
From prince to peasant, one and all
Mourn, long-loved daughter, o'er thy pall,
So sad 's the scene !

Thy gentle feet in fondness sped
Beside thy suff'ring offspring's bed,
And 'mid the breath
Of silence—but to sooth to joy—
Thy lips received from thy sweet boy
The kiss of death !

Now with thy daughter, one with thee
Robed in bright imortality
In perfect rest :
Tho' dead to those who mourn thee here,
'Tis *life* in thy celestial sphere ;
Divine behest !

Yes, gone ! but minist'ring still :
Angelic, to diviner will—
How few divine
The power that bids the spirit leave
The spheres, and here a halo weave,
Or sacred shrine.

Thy mouring star of day will dawn,
And bring not thee ! to those forlorn
Some sad lyrist
Will chant thy name, and o'er thy loss
Bow in submission to the cross,
The Cross of Christ !

E'en now we raise an anthem there ;
Where lips immortal ever share
The songs of love !
E'en now unveil the mystic spheres,
And see thee happy thro' our tears
In peace above!

HENRY GEORGE HELLON.

MESNY'S COMBINED LIFE-BELT AND PILLOW.

BY this invention a belt is produced of india-rubber or caoutchouc, or such like pliable water and air-proof material, which will be similar to an air mattrass. Air compartments are provided (usually four) dividing the life-belt, for convenience, in folding it into a pillow, when desired to use it as such. These air compartments communicate with each other by small air channels, and a flexible tube, with mouthpiece, is used for inflating the belt. Belts and buckles for fastening around the waist are provided, and suspenders to keep the belt well up under the arms; also a button-hole and button to keep the belt folded for use as a pillow. Between the divisions is a space to allow for the thickness of the divisions in folding the belt.

Mr. Frank A. Buell, of Brooklyn (E. D.), N. Y., has patented an improved saw set, having a forked shank adjusted by a bolt, and provided with arms having guage screws for limiting the set of the tooth.

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SIR DAVID BREWSTER, K.H., LL.D., F.R.S., &c., from the establishment of the INVENTORS' INSTITUTE, till his decease, February, 1868. LORD RICHARD GROSVENOR, M.P.

President, SIR ANTONIO BRADY.

SESSION 1878—1879

Members' Meetings—at 8.15 p.m.—

Thursday, January 9th, a Conference on the Patent Laws.
Thursday, January 23rd.—"The Electric Light."

Executive Council Meeting at 7.30 p.m.

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.

F. W. CAMPIN, Sec.

Proceedings of the Institute.

During the past month (December) we have simply to chronicle the Inventors' Dinner, which was a great success, a full report being given in another column.

POSTPONEMENTS.—From pressure on our columns we are compelled to postpone several important Reviews.

Monthly Notices.

Mrs. Solly.—Another contemporary and friend of the great scientific workers of the early years of our century has passed from among us. Dorothea, widow of Samuel Solly, Esq., F.R.S., died at Myrtle Cottage, Parkstone, in Dorsetshire, on the 23rd of November, at the age of ninety-one. Mrs. Solly was the daughter of the Rev. T. Racket, F.R S., who for more than fifty years was rector of Spettisbury, in Dorsetshire. Her father and her husband were among the earliest promoters of the Royal Institution of Great Britain. She enjoyed the intimacy and friendship of many of the great men who early in the present century took a lead in scientific discovery or advanced the progress of English literature and Science, and she could tell from personal knowledge of many an incident in the lives of Davy and Brande and Faraday, of Robert Brown and Sir J. E. Smith, of Mrs. Garrick and Hannah More. To within about a year of her death her physical powers remained nearly unimpaired, and she would still walk over her Dorsetshire hills without fatigue, and with all the enjoyment of youth. She retained to the last her interest in the progress of science, and could appreciate in all its significance the marvellous development of the discoveries with whose fancy long years ago she had been familiar.

Cyprus.—An interesting article on Cyprus has appeared in M. Drapeyron's *Revue Geographique.* Its author, the Marquis de Sassenay, appears to have consulted a large number of authorities, but says nothing that is new to English readers. Like most other authorities he identifies Mount Troodos with the Olympus of the ancients. This, we fancy, is a mistake. The mountain to the west of Larnaca, now known as Stavro Vuni, is clearly the modern representative of the Olympus, the site of the heathen temple being occupied by a monastery. A base line for the trigonometrical survey of Cyprus has been measured, and much progress made with a revenue or cadastral survey. The Cypriotes will be more fortunate in this respect than are the inhabitants of these islands, for, though a costly ordnance survey has been in progress for nearly a century, we have no such thing as a revenue survey.

Mr. John Thomson has submitted by request to the inspection of the Queen the series of sixty views that will form the illustrations of his forthcoming work, which is entitled "Through Cyprus with the Camera in the Autumn of 1878." It will be published by Messrs. Sampson, Low & Co.

Electric Lighting at the Reform Club is announced to be tried in some rooms which are well adapted for that form of artificial illumination. As a steam engine is employed on the premises, it will be possible to produce the required electricity at a trifling cost, and to effect a great saving over the existing system of lighting.

Mr. George Dawson Rowley, a well-known ornithologist, died at Chichester House Brighton, on Thursday, the 21st inst., in the fifty-seventh year of his age. Mr. Rowley was educated at Eton and Trinity College, Cambridge. He was a Deputy-Lieutenant for Rutland, and high sheriff for that county in 1870. Mr. Rowley published the "Ornithological Miscellany" and other works on scientific subjects. He is said to have left many unpublished manuscripts, the results of his scientific researches. —*Athenæum.*

An allotropic condition of copper and antimony apparently produced by electrolysis, is described by M. P. Schutzenberger in the *Comptes Rendus*, who refers to experiments by himself and Mr. Gore. He proceeds to explain that he has obtained lead in a new and remarkable condition, proving a fresh example of allotropism by electrolysis.

Electric Lighting of Colliery Workings.—At the Trafalgar collieries a successful experiment was last week made in lighting the pit banks. The result leads the Messrs. Brain to hope that they may constantly use this light at their extensive works.

The Permanent Magnet as a Motive Power.—Miss Harriet Hosmer, who has taken rank among artists as a clever sculptor, aspires to make for herself a name among original inventors. She professes to have discovered an entirely novel mode of employing the permanent magnet so as to cause it to produce motive power, and Mr. Browning, the scientific instrument maker, is constructing an engine after her plans.—*Athenæum.*

The Australian Exhibition, 1869, it has been announced, has been so far arranged for, that the regulations for British exhibitors have been settled. These, with the forms of application, are now obtainable from the honorary secretary of the London Committee, 3, Castle Street, Holborn.

The Scientific Review.

JANUARY, 1879.

THE INVENTORS' DINNER.

The following statements will show that the proceedings at the Dinner of members of the Inventors' Institute and friends of the Inventors' cause, which took place at St. James's Hall on 12th December ult., were of the highest importance, and therefore worthy of the prominence we now wish to accord them.

Sir Antonio Brady, the President, occupied the chair, and was supported by Admiral Selwyn, Vice-President, Mr. F. Campin, the Secretary, Mr. J. Saxby, Mr. F. H. Varley, Mr. Pulvermacher, Mr. Hume Williams, Mr. M. Zingler, Mr. Samuel Chatwood, Mr. Newton Wilson, Captain Davies, Mr. Hughes, Mr. J. P. Cutts (Director of the Inventors' Patent Right Association) and Mr. T. Morgan. After proposing the toasts of the Queen and the Royal Family and the Legislature, which were duly honoured, the Chairman proposed "The Army, Navy, and Reserve Forces," and referred to the influence of modern inventions upon the warfare of the present day.

Admiral Selwyn, in replying to the toast for the navy, suggested that chemistry might yet give us a poisonous shell which, if well placed, would decide at once the fate of a naval combat.

The President rose and stated that as he considered it a desirable thing that festive gatherings should not be attended with too much speech making, and he knew that his friend Admiral Selwyn had an important statement to make with regard to the Congress at Paris, at which he might state that both himself and the Admiral were present as representatives of the Inventors' Institute, he should refrain from any further observations, and would propose "The Inventors' Institute," coupling with it the names of Messrs. Varley and Campin.

Mr. Varley, in responding, said the Institute was established in 1862, at a time when the the notion in this country was that patents were a myth; that inventions ought to be as free as the air; and that there ought to be no patent rights at all. Believing that if progress was to be made we must give a short protection of a certain period to the inventor in his own discovery, the Institute had laboured on to achieve that, and protect men who conferred by their genius such benefits on mankind. But the present patent system was not what could be wished, and they thought the law might and could be profitably and equitably amended and improved. They thought that the cost of registration was unnecessary, and a great deterrent to our commercial prosperity. He alluded to the American system, and to the boast of our Yankee brethren that they supplied the whole world with inventions. Having regard to the fact that we have the greatest mercantile marine in the world, why, he demanded, should we not ourselves supply the markets of the world. In conclusion he expressed the conviction, that if we made our patent fees more moderate than the most moderate nation, it would advance the material prosperity of England and set free the machinery of commerce everywhere. (Cheers.)

Mr. F. W. Campin remarked that the Institute had done a great work. He was pleased to find not long ago, in the *Times*, an article which said that the question of patent laws must be considered settled, and that protection for inventions ought to be continued in accordance with the decision of the Congresses at Paris and at Vienna. And this was a great feather in the cap of the Institute. Admiral Selwyn, who was a prominent member of the recent Paris Congress, had been working shoulder to shoulder with himself from the beginning, and the worthy Chairman also had worked most energetically for inventors' rights, and they were not a bit disheartened though they had had a lot of rebuffs, but that mattered not two straws. They should work on still, and he felt they should very shortly effect the objects the Inventors' Institute sought to accomplish. (Hear, hear.)

The Chairman then proposed the toast of the evening "The Inventors' Cause," and alluded to the fact that the Paris Congress had done a work which would benefit alike inventors and the nations of western Europe. No one could have represented the Institute at the Paris Congress better than Admiral Selwyn, nor with greater ability, tact, and judgment; he would therefore ask him to respond to this toast.

Admiral Selwyn, in responding to the toast of "The Inventors' Cause," said,—Gentlemen, I am happy to say that I have been able hitherto, when I was in England, to undertake the periodic duty and to receive the periodic pleasure of attending the meetings of the Institute in their convivial festivity annually renewed. But to-night I have to do something more than that, and I have the greater pleasure, because the more prominent one, of assuring you that your cause has received that recognition for which hitherto it has sought in vain. For centuries past inventors have been regarded as what one might call abnormal excrescences of society; men who, if they had a notion of what could be done, were very nearly lunatics, and ought to be treated as such until they acquire some property, under which condition they might be easily wronged. But the world has at last, towards the close of the nineteenth century, awakened to a great fact, and it is this: that for centuries before that great era with which we begin our reckoning, prophets were sent upon this earth to tell to man how moral progress might be made. Those prophets were received by men just as inventors have been in later days received by what is called civilized society (hear, hear), with contumely, with reproach, with robbery, with murder. (Hear, hear.) For that is not less murder which condemns an inventor to starve, than that which places an advocate of a high moral theory on the cross. (Hear, hear.) When the era arrived at which no more moral knowledge communicable was necessary, then began the era in which material progress was the necessity of mankind, and for that purpose, and with that object, the prophets of material progress were sent upon the earth—not to the wise, not to the noble, not to the many, was the advocacy of this material progress committed—but to the few and the despised, and, as I have said, to the so-called lunatics. But the inventors have done a noble work, and on their labours rest all that we call material progress to-day. Few, indeed, when they pass through that magnificent illumination which we see in our streets to-day remember the slow labours of the inventors by which that result has been brought about. Still fewer go back to the time when painfully and laboriously by slow degrees we won only a ton of iron from an expenditure of many tons of fuel; and remember the name of him who taught us first how economically and successfully to produce iron. Few, again, remember how the intuitive thought of mankind has been able to flash across the continent, across the seas, or under the seas—due to the work of the prophet of material progress—by electricity from labour and toil for the benefit of general society which would now be a boon to illumination. But to-day I see the dawn of a brighter era. On the continent there has been a new and most promising feature in our history. The Republican government, anxious, perhaps, to please those on whom it founded its power, has recognised for the first time the necessity of conceding to the lowest worker in the state the same rights of property as are enjoyed by the highest nobleman. (Applause.) Thus, then, the Paris Congress, originally the work of a few earnest men, has developed into the favorite idea of the chiefs of intelligent France. The Minister of Commerce and Agriculture has undertaken to make it a diplomatic and international question (hear, hear)—not a sterile congress remains now to be spoken of, but the appointments by the Minister of Commerce of a permanent committee charged to work with the Minister of that great country, in order to do—what? Why to satisfy the million workers and to produce great results and great riches from the industry so developed. (Hear, hear.) Thus, gentlemen, the very first movement of the Paris Congress was to found a wise and broad basis of action. It has been said that patents for inventions are a monopoly. It was necessary to strike at the root of that idea. Therefore you will find in the report which has been disseminated among you by means of the journal of the Institute on that point—that the first resolution decided this great fact, the right of inventors to their works and of manufacturers to their trade marks,—is a right of ownership; the civil law does not create it, but only regulates it. (Applause.) Thus it is that they recognise that the invention was the seed corn of industry, and required and deserved as much protection as the seed corn of our harvest has always received from an intelligent government. (Hear, hear.) The next wise and bold provision for an international law, the greater admission from such a country as France is that natives and foreigners should be on an equality. (Hear, hear.) You will understand, I am sure gentlemen, the wisdom and necessity of founding this broad basis. Before they went into the details they cut into the root of all the objections which have been adduced—they founded a broad basis which recognised inventors as benefactors, not only of the nation in which they reside, but of all mankind for all centuries. The next thing, a practical point which we all rejoice in hearing, is that the tax on all patents should be progressive, starting from a moderate sum. It should be annual, but only payable in the course of the year. Now, I am bound to say on this point that I and others working with me have thought that there was a little more practice in figures to be obtained than is shown in that resolution; we find out that to be moderate, nothing less could be accepted than the tax already accepted in France, or that if £7 or £10 were to be the maximum tax, that then the annual tax—particularly a progressive tax—would be like the nail in the horse's shoe, would have to start at one franc in the course of the year and arrive at more francs in the course of time, which would make a greater sum than was calculated upon at the beginning. I am afraid that our friends in Germany have found out to their astonishment that the old proverb of the nail in the horse's shoe is still perfectly true; and that although they started with the idea of a small tax, that by making it progressive they have made it a large tax, and one which must weigh on the country. Let us not think it is a tax upon the inventors, for, as I have said, it is a tax on the seed corn of the industry of the country, it is a tax on the capitalist, it is a tax on the purchaser, and a tax on the consumer, and, last of all, a proportion of that tax falls on the inventor who gets but little out of it; but the capitalist and the consumer pay by far the greater proportion of it, and if it becomes a prohibitive tax, there is no estimating what is the loss to the nation by declining to receive one useful invention. (Hear, hear.) Well, now, the next clause was, that patents should be granted for all inventions, processes, or products, except combinations or plans of finance, or credit, or inventions, contrary to the public order or morals. This is conceding that there is no invention in existence which the public buys and accepts which may not be useful to mankind unless it can be shown to be against public order or morals; and it includes those subjects which have long been discussed, pharmaceutical and many others, which have hitherto not been patents; and they say that the man who possesses the secret of health, or thinks he does, even Morrison's pills, if they be productive of some satisfaction to the interior of certain individuals who take them, that then they ought to be as patentable as any other invention. They are certainly not contrary to public morals as far as we know. The next point is that a patent should be granted to every applicant at his own risk and peril: that is to say, there is no power in the Government to refuse to any man who brings an invention to them on any pretext whatever a patent for invention. But we saw that might easily lead to an abuse such as we lament in this country—that is to say, that two persons might go in perfectly *bona fide* with the same invention in nearly the same words on two different sheets of paper, both might receive the good patent, and nobody would rejoice over that state of things except those of the law who might rejoice at receiving their fees for the matter. We therefore press very strongly indeed for a preliminary examination of an advisory character such as is in vogue in the United States of America. But your delegates were defeated on that point, and were only able to get a compromise after a considerable fight, which was that there should not be a preliminary examination but advice. You see the same thing by suiting the ideas of a country may be brought about without insisting on the precise words which I gave for the examination, and said there shall be an *avis prealable*, which is equal to giving advice of the documents which are to exist for a certain time in the office itself; there is to be no examination, properly speaking, but you are to be told that there is an exemption, we will say, for twenty-one years, and there is kept in the office a precisely similar document for a similar purpose. But if that is the case the office has no right to refuse your title to it, and it would give you your patents at your own risk and peril; and that is the point which the Congress has decided (cheers), and the words in which it is put are these:—"A patent shall be granted to every applicant at his own risk and peril. It is, however, advisable that the applicant shall receive a previous and secret opinion especially on the question of novelty *avis prealable*, to enable him at his discretion to maintain, modify, or abandon his claim." That is the best we can get, and I think it will satisfy most inventors. (Hear, hear.) Now, there is another point. You are aware there has been a bitter contest waged by those who wished to infringe patents as to compulsory licences and as to compulsory working. On that point the conference has said and laid down unmistakably that patents should ensure for the whole term of their duration to the inventors or their assigns the exclusive right of working the invention and not merely the right to a royalty to be paid by the other parties working it. Now we come to the definition of "infringement," which is a moot question, and so long as it is subject to special interpretation in certain courts this must always be a difficulty in obtaining a great modification such as we propose of the law. But the congress has said that the infringement of a patented invention, a trade mark, or an industrial design or model that has been registered, is an offence against common law. Now, gentlemen, you will easily see why we fought and why we brought out this question of what is a trade mark. We say it is a signature, that it is nothing more nor less than a written and complicated signature, intended to assure you upon the good faith of individuals just the same as the signature of an individual appended to a promissory note or bill is intended to assure you of the good faith of that individual, and it ought to be treated as great an offence to counterfeit both in the interest of the public as well as for the profit of the man who deals in sheet iron to make boilers (for if his trade mark be counterfeited it may lead to the blowing up of the boiler) as it is to counterfeit the signature of a promissory note, which might sometimes bring about commercial crises. Admiral Selwyn went on to explain that although the Congress held long sittings, and was well organised as to sections, yet it was found that there were many details that could only be effectually dealt with by a permanent committee or commission of which he had been appointed vice-chairman, and that he had already taken active steps with regard to the matter.

At the termination of the Admiral's speech there was loud and prolonged applause.

Mr. **Broadhurst**, in a telling speech, referred to the success of the Institute and its proceedings. As Parliamentary agent to the Trades' Societies of England, he had done his best to promote the Inventors' interest, and had, on all occasions, worked in the closest harmony with his friend Mr. Campin and the Institute. He alluded with pleasure to the fact that he had been instrumental, with others, in preventing passing into law the last Government Bill on Patents. The Prime Minister once said that Parliament was never ruled by logic and reason. His own experience fully bore out the truth of that assertion, and it was only by constant attention to the Inventors' interests that Parliament would ever be induced to do anything for the great and good cause the Inventors had at heart. (Applause.)

Mr. **Carl Pieper**—Sir Antonio and Gentlemen, I am glad to be allowed the honour of responding for the guests. With regard to the Paris Congress, I have not the least doubt that if we had not had a gentleman from England so capable of dealing with certain resolutions which will always appear at such Congresses—what the French call *un feu terrible*—if he had not had the faculty of keeping away what went in the direction of absurdity by simply exposing it in the most gentlemanly manner, I can assure you that from the 5th to the 12th September, we should not have finished what we did, nor should we have passed the resolution which have been passed. I mean that if Admiral Selwyn had not been the one that supported immediately the proposal made by Mons. Broadenhamer to carry out the heavy work we had to perform in drafting a sort of International law on the telegraph arrangements, postal rights, and so forth, we should not have got through it. But Admiral Selwyn and other gentlemen, after a short conference, framed a Patent Law in the Committee, which scheme has been sanctioned, and which has become, I believe, the first cause already of Diplomatic action. I may assure you that that scheme, which has been approved, is the first step towards an official Congress of all the delegates of the Governments, which are united by such members of your Society as might be elected if future Congresses take place. I do not doubt for a minute that the Congress, which has been in Paris assembled, and the Committee that has been elected to pursue the course they have, will very soon be joined by delegates of different Governments. Mr. Pieper added some pertinent remarks on the working of the German Patent Law.

Mr. **Hume Williams** proposed the toast of the Chairman of the evening, Sir Antonio Brady, President of the Inventors' Institute, and said he was present at the very first meeting of the Institute to consider the then doubtful position of the Inventors' cause. Many illustrious men who have now passed away were there to aid in resisting the attempts then made to repeal the Inventors' rights, and to promote that legislation which would increase the facilities of invention, in fact, he believed, that at the present gathering, besides himself, Admiral Selwyn and Mr. Campin were the only original members at table. They would easily judge of the difficulties encountered seventeen years ago in sustaining the rights of Inventors, when now, after so many years, they still found themselves battling for the cause of invention. The Institute was happy in having had the benefit of presidents of high distinction, the first one, that eminent man of science, Sir D. Brewster; the second, a worthy scion of the ducal house of Westminster, Lord Richard Grosvenor, and now had at its head an eminently practical man. (Hear, hear.) Inventors are much indebted to the Institute for the efforts it made on their behalf. To carry out the ends they had in view a united front was necessary, and individual efforts would not have that weight on the Government in dealing with a question of such magnitude as affecting Inventors.

They must all unite in influencing Parliament. He thought the Bill of the Institute did not—except in one or two points—differ from that of the Lord Chancellor; and if the energies of the Institute were brought to bear, he considered that Bill might be so modified as to become the accepted law of this country. He was sure that, to enable that to be done, the voice of the Inventors' Institute would have great power and influence. He had great pleasure in drinking the President's heath.

This toast was drlunk with great applause accompanied by musical honours.

Sir Antonio Brady then retired from the chair, which was taken by Admiral Selwyn. He gave the "Executive Council of the Institute," which was suitably responded to by Mr. A. J. Murray, who remarked that the inventors' property in his inventions was an undoubted common law right; and, therefore, he felt that the Executive Council, in seeking to uphold and improve the patent laws, was worthy the support of everyone.

"The Officers of the Institute" followed, and coupled with this toast was the name of Mr. F. W. Campin, the Secretary, who duly responded.

"The Poor Inventor," succeeded.

The Honorary Secretaries of the Dinner Committee were then toasted, to which Mr. T. MORGAN replied.

Amidst much applause, "The Health of Admiral Selwyn" was proposed and drunk, to which he responded.

During the evening the *Scientific Review* was referred to as of great value as a help of the Inventors' cause, and the support of the members was asked for the increase of its influence and circulation.

During the evening a selection of music was given by Mr. W. Porter, organist of St. Mary's, Newington, and songs were sung by several members of the Institute.

A NEW FOOT POWER.

FOOT power is undoubtedly more convenient and economical than any of the motors yet devised for propelling light machines, such as sewing machines, lathes, &c., therefore it is important to utilise this power to the best possible advantage.

One of the most recent contrivances for converting the oscillating motion of foot pedals into a continuous rotary motion consists in a machine in which the motion of two pedals is alternating. The cord which is attached to the frame and extends downward under the pulley on one of the pedals, runs upward over one of the pulleys on the shaft of a sewing machine, over an intermediate pulley, thence over the other pulley on the shaft, and downward around the pulley in the other pedal, thence upward to the frame. The two pulleys, which are placed loosely on the sewing machine shaft, each carry an arm having two pawls that engage a ratchet wheel secured to the sewing machine shaft. There is a separate ratchet wheel for each pulley. A downward movement of one of the pedals rotates one of the pulleys on the sewing machine shaft in one direction and the other in the other direction. The one making the forward movement rotates the machine, while the pawls carried by the other pulley simply make a retrograde movement preparatory to the descent of the other pedal.

The oscillating motion of the pedal is in this manner converted into a continuous rotary movement which must always be in one direction, thus avoiding both the trouble of starting the machine and the possibility of turning it backward. Another important advantage gained by this method of converting motion is that any motion of the pedals, however small, results in turning the machine.

The patentee is Mr. W. F. Lane, Elgin, Ill.—*Scientific American.*

Proceedings of Societies.

ROYAL SOCIETY.

NOV. 21ST.—Sir J. Hooker, President, in the chair.—The following papers were read: "On a Method of using the Balance with great delicacy, and on its Employment to determine the Mean Density of the Earth," by Mr. J. H. Poynting; and "On Repulsion resulting from Radiation," Part VI., by Mr. W. Crookes.

NOV. 30TH.—Anniversary Meeting.—Sir J. Hooker in the chair.—Announcement was made that the finances of the society are in a satisfactory condition, that within the year twenty-one Fellows on the home list and six on the foreign list had died, and that seventeen had been elected. Among the subjects that fell within the scope of the President's address one will be regarded with surprise and satisfaction, namely, the abolition of the £10 admission fee, and the reduction of the annual contribution from £4 to £3. This will be good news for all those who hope to attain to the distinction of F.R.S. in future. Considering the difference in the value of money, it is something more than a return to the old practice under which the Fellows paid £2 12s. as their annual contribution, and of which the Rev. H. H. Baber and Sir Henry Ellis, who died in 1869, were the latest examples. The deficiency in the society's income occasioned by these remissions will be made up by a special fund raised among the Fellows by contributions ranging from £5 to £2000. Mention was made of that astronomical problem, the distance of the sun from the earth, and the means now available for solving it; of the discovery of satellites and planets; of solar and stellar spectroscopy; of Jannsen's "wonderful photographs of the sun;" of the supposed existence of carbon and oxygen in the sun; and the "breaking-up of the molecules of bodies hitherto regarded as elementary." Considering that botany has been Sir J. Hooker's life-study and pursuit, his sketch of the recent progress of botanical science could not fail to occupy an important part in his address. In this are comprised Count Saporta's "L'Ancienne Végétation Polaire," Dyer's "Plant Distribution as a Field for Geographical Research," Robert Hooke's "Micrographia," and microscopical discoveries, the researches of Nageli, Sachs, Strasburger, Burdon Sanderson, Kunkel, Munk, Schwendener, and Darwin. In closing his address Sir J. Hooker stated the reasons that induced him to resign the chair which during five years he has so worthily filled. They are the ever-growing pressure of his duties as director of the Royal Gardens at Kew, and the obligation under which he lies "to complete scientific works, undertaken jointly with other botanists" before he was elected P.R.S. At the same time he is not of opinion that the presidential term for the Royal Society "should be either short or definitively limited." After delivery of the address the medals were presented: the Copley to M. Boussingault; to J. A. Broun and Dr. Günther each a Royal Medal; the Rumford to M. Cornu; and to MM. Cailletet and Pictet each a Davy Medal. M. Cailletet and Dr. Gunther were present at the meeting, and received their medals in person; the others were kept away by age, ill-health, and official duty. The proceedings terminated with the election of Council and officers, in which no change was made in the list already published. Mr. W. Spottiswoode, who has held the post of treasurer of the Royal Society since 1870, is now the president, and Mr. J. Evans (recently president of the Geological Society) is the new treasurer. The personal and scientific character of these two gentlemen may be accepted as an assurance that the honour and dignity of the Royal Society will be adequately sustained.

ASIATIC SOCIETY.

NOV. 18TH.—Sir H. C. Rawlinson, President, in the chair.—Sir A. Slade, Bart., and Mr. S. Takatoyu Juonyé were elected Resident, and Mr. J. Jardine, Judicial Commissioner British Birma, and Mr. C. H. Lepper, Eria Barree, Upper Assam, Non-Resident Members. Mr. Brandreth, as delegate from the Asiatic Society, spoke of the great success of the Oriental Congress, held at Florence in last September, and mentioned the kindness of the Italian hosts, and the remarkable number of distinguished scholars who were present. He added that no one could have come away without a personal sense of the obligation conferred on stranger visitors by the indefatigable exertions of the able secretary, Prof. de Gubernatis, upon whom all or most of the work fell. A paper was read, communicated by Mr. E. Thomas, "On the Postion of Women in the East in Olden Times," in which the writer called attention to a custom common in the ancient world, and still prevailing in some parts of the East, of naming children after the mother rather than after the father, showing as this does the prominent influence of the women. This subject he illustrated by reference to the well-known usages of Lycia, Caria, Etruria, Persia, ancient and modern India, Ceylon, and Australia.

ENTOMOLOGICAL SOCIETY.

NOV. 6TH.—H. W. Bates, Esq., President, in the chair.—Mr. Waterhouse exhibited a specimen of *Chauliognathus excellens* (Telephoridæ), a new beetle from New Granada; Mr. H. Stainton a new horn-feeding Tinea (*T. Orientalis*), reared by Mr. Simmons of Poplar; the Rev. H. S. Gorham some rare British beetles taken in the neighbourhood of Horsham, Sussex; Mr. Goss specimens of a rare dragonfly, *Cordulia Curtisi*, from Christchurch, Hampshire; Mr. Meldola a specimen of *Erebus odorus*, from Jamaica, possessing large tufts or brushes on the hind legs, considered as probably scent-secreting organs; Prof. Wood-Mason drawings of, with remarks upon, the flowers simulating Mantidæ; Mrs. R. Clay a living specimen of a beetle, *Zopherus Bremei*, from Yucatan, worn as an ornament; Sir S. Saunders specimens of *Blastophaga Psenes*, Linn., employed in the process of cuprification, received from M. J. Lichtenstein, of Montpellier; also specimens of *Sycophaga crassipes*, West., from the Sycamore figs of Egypt, together with certain apterous associates.—The Secretary read a communication from the Board of Trade with reference to to the damage done to the corn crops in the neighbourhood of Mariapol by swarms of a beetle *Anisoplia Austriaca*. A sub-committee was appointed to draw up a report on the subject. Miss E. A. Ormerod read a paper "On Psila Rosæ," the well-known insect producing the so-called "rust" in carrot crops. She advocated the use of a phenol preparation for the destruction of this pest. Mr. Waterhouse read a paper containing "Descriptions of New Telephoridæ from Central and South America." Sir S. Saunders communicated a paper "On the Habits and Affinities of Sycophaga and Apocrpyta from the Sycamore Figs of Egypt." Mr. Distant communicated "Descriptions of New Species of *Hemiptera-Homoptera*."

STATISTICAL SOCIETY.

NOV. 19TH.—Mr. G. J. Shaw-Lefevre, President, in the chair.—Thirty-two Fellows were elected.—The Howard Medal of 1878, with £20, has been awarded to Surgeon J. Martin. An Extra Prize Medal has also been awarded to Captain H. Hildyard. The President, in his opening address, commented on the past work of the society. Prof. Jevons afterwards explained the Arithmometer of M. Thomas, with the object of showing to what extent it can be made available by statisticians for heavy calculations of per centages, &c.

MATHEMATICAL SOCIETY.

Nov. 14th.—Lord Rayleigh, President, in the chair.—After the Treasurer's and Secretaries' reports had been read and adopted, the meeting proceeded to the election of the new Council. Mr. C. W. Merrifield was elected President, and Prof. Cayley and Lord Rayleigh Vice-Presidents. The Council were also elected. Mr. Merrifield having taken the chair, Mr. J. D. H. Dickson was elected a member. The Rev. A. Freeman and Prof. Reinold were admitted into the society. The Chairman read a letter from Mr. Warren De La Rue respecting a memorial to M. Leverrier. Lord Rayleigh communicated a paper "On the Instability of Jets;" Mr. H. Hart read a short note, by Prof. Crofton, "On Self-Strained Frames of Six Joints; and Mr. Tucker (hon. sec.) read an abstract of a third party "On the Calculus of Equivalent Statements," by Mr. H. MacColl. The last paper contained the solution of a test-problem to show the power of the author's method of elimination; then an explanation, with illustrations and applications, of another allied method, which he calls "the method of unit and zero substitution;" a brief indication of the way in which the algebra of logic may render important service to scientific men in investigating the causes of natural phenomena; and, lastly, a brief criticism of Prof. Jevons' method of solving logical problems.

PHYSICAL SOCIETY.

Nov. 23rd.—Prof. W. G. Adams, President, in the chair.—Prof. W. E. Ayrton, late of the Imperial Engineering College, Tokio, Japan, read a paper written by himself and Prof. J. Perry, of the same College, "On the Music of Colour and Visible Motion." The authors began by pointing out the well-known fact that emotion is excited by moving bodies, and they believed that upon this basis a new emotional art would be created which would receive a high development in the far distant future. All methods of exciting emotion could be cultivated; but of these, music, by reason of the facility with which its effects could be produced, had been highly perfected by the bulk of mankind. Sculpture and painting are not purely emotional arts like music, inasmuch as they involve thought. It would take a long time and much culture for the eye to behold moving figures with similar emotional results to those of the ear on hearing sweet sounds, but time and culture only might be necessary. It might be due to their neglect of this emotional tendency that the Western nations felt little emotion at moving visual displays. For among the Eastern nations they had entertainments consisting of motions and dumb show, which, although incomprehensible and even ludicrous to the European, powerfully affected the feelings of a native audience. In Japan the authors had seen whole operas of "melodious motion" performed in the theatres, the emotions being expressed by movements of the body, affecting to the audience, which were quite strange to them. The accompanying orchestral music was, withal, displeasing to the authors; while, on the other hand, Western music is most displeasing to the Japanese. The emotions produced by rapidly moving masses—such as a train bowling up to a bridge, or by changing colours as in sunsets—have been felt by all. Harmonic instruments have been constructed to exhibit the combination of two or more pairs of harmonic motions to the eye; for example, Blackburn's pendulum, Lissajous's forks, Wheatstone's kaleidophone, and Tisley's harmonograph. Prof. Ayrton illustrated his remarks by exhibiting these instruments in action. The pendulum traced out the complex path of the combined motions by a jet of falling sand, the forks by a moving beam of light thrown on a screen, the kaleidophone by a bright bead, and the harmonograph by the involutions of an aniline pen. With none of these and such like instruments, however, is the production of mere motion the end in view; and in most of them no change can be made in the periods of the pairs of harmonic or periodic motions combined without arresting the instrument, a proceeding which in music would be analogous to stopping the tune at the end of every chord. There is no provision either for changing the amplitude or phase. A successful instrument in the new kinematical art must visibly render changes in period, amplitude, and phase of the harmonic motions represented. Profs. Ayrton and Perry had designed an instrument, which was now in Japan, for effecting these required changes in a combination of harmonic motions given to a moving body, and which they claimed to be the first musical instrument of the visual art in question. They had not given it a name yet, because the nomenclature of the subject was uninvented. A diagram of this instrument was exhibited to the meeting. It consists of a mechanical arrangement of levers, pulleys, and cords, whereby two harmonic motions, one along a vertical and the other along a horizontal line, are compounded in the resultant motion of a suspended pane of glass. A black circle painted on the pane is intended to represent the moving body as projected against a wall or screen behind. The levers moving the pane are actuated by a revolving barrel, the periphery of which is carved according to mathematical principles, so as to give the different harmonic motions to the levers in one revolution. The motion is further regulated by shifting the levers, and by the angular velocity of the barrel. In this way, the period, amplitude, and phase of the component motions of the glass, either in a vertical or horizontal direction, may be changed at will, and almost immediately. Other kinds of periodic motions may be compounded in a similar way. Prof. Ayrton also suggested other forms of apparatus for this purpose. Numberless combinations of graceful motions producing emotional effects on the beholder can by its means be given to a visible body. It is the intention of the authors to construct an improved form of the apparatus, and to arrange for the blending of colour with the moving body to heighten the emotional influence. For example, they propose having changing mosaics of different hues thrown upon the screen for a background to the black spot. This can be done by means of an instrument similar to the chromotrope, with its revolving sheets of parti-coloured glass. In conclusion, Prof. Ayrton said that there might yet be invented many different ways of producing these spectacles, and there was no reason why a whole city full of people should not enjoy these displays projected upon the clouds overhead. In the short discussion which followed, Dr. Stone pointed out that the Japanese employ a different scale to that of the Western nations, and that therefore our music may seem odd to them as theirs is to us. The ethnological difference of ear between the Chinese race and ourselves is a subject worthy of investigation. He attributed the influence of pantomime on the Japanese to association, and asserted that music not only produced emotions but suggested ideas. The harmony of music, poetry, and motion were well known, and tone poet was a name given to composers. Dr. Gladstone remarked that all the senses could be harmonised when sufficiently educated, as witnessed to by the art of the cook and the perfumer. Sugar and nitre when tasted separately were not disagreeable, but when tasted together the effect was very nauseous, and great quantities of beet-sugar had been vitiated by small traces of nitre from the beet-root. Prof. Ayrton also alluded to the curious fact that certain persons on hearing music seemed to see changing colours or landscapes arise before them, and others see bright lights on hearing shrill sounds. Dr. Schuster then described his new method of adjusting the collimator of the spectroscope for parallel rays of different refrangibility. His plan is very simple, and is based on the fact that if the rays entering the prism are parallel the focus seen in the telescope will remain constant when the prism is turned round; but if they are not parallel the focus will shift. The process, therefore, consists in looking through the telescope while turning the prism. If the focus shifts the collimator has to be adjusted until no shifting takes place. The adjustment must be made with a prism whose sides are perfectly plane, and a good one may be kept for the purpose.

HISTORICAL SOCIETY.

Nov. 14th.—Annual Meeting.—Lord Aberdare, President, in the chair.—Profs. Stubbs and Max Müller, Mr. H. M. Stanley, and Mr. T. Sopwith were elected honorary members, and thirty-five ordinary members were also admitted. According to the Treasurer's report the society's income was £1,055, being nearly £200 in excess of last year. During the year 114 persons had applied for membership, of whom 109 had been elected, the entire membership being now 606. Lord Aberdare then delivered an inaugural address.

ANTHROPOLOGICAL INSTITUTE.

Nov. 12th.—Dr. John Evans, President, in the chair.—The following new members were announced: Messrs. M. J. Gabriel and George H. Radford. Mr. R. Cust read a "Report on Anthropological Proceedings at the Oriental Congress," in which he gave a digest of all the papers and discussions at that Congress which appertained to the science of anthropology. Mr. Park Harrison read a paper "On some Characters which are still in use as Tattoo Marks by the Motu," in the south-eastern peninsula of New Guinea. About half of the forms tatooed on a Motu girl, carefully copied by Dr. Turner, correspond with the letters found in Asoka inscriptions in India, which are believed to be allied to Phœnician, whilst several others resemble letters admittedly derived from the same stock, but independently acquired. They are mostly arranged in groups of three. On the right hand, however, there are nine or ten connected by a line running above them all. The characters are twenty-three or twenty-four in number, and are formed of straight lines in the following combinations, viz., five of two lines, nine of three lines, five of four lines, and three of five lines, much in the same proportions as in the Renang and Lampong alphabets of Sumatra, the letters in the former of which have been shown to be identical with Phœnician characters *reversed*. Archaic forms of letters have also been met with in other islands of the Indian Archipelago and Melanesia, but are now without meaning. The Motu characters are used simply for ornaments or charms. As an example of the use of letters for tattoo marks, the case of the Australian subject was cited, who, having been taken prisoner in Burmah a few years ago, was there tattooed with letters and other patterns. Besides the characters on the Motu girl, there are various pictures and hieroglyphics, consisting of eyes and eyebrows, a lunar crescent, and other forms. An interesting discussion ensued.

Nov. 26th.—Dr. J. Evans, president, in the chair.—The Rev. J. Robbins was announced as a member. Mr. W. G. Smith exhibited a series of flint implements from the valley of the river Lea. Mr. A. L. Lewis read a paper "On the Evils arising from the Use of Historical National Names as Scientific Terms." The director read a paper, by Prof. D. Wilson, "On some American Illustrations of the Evolution of New Varieties of Men." In the mingling of different races in America, so complex and varied, all subjected to the influence of climate and social habits, and all mingling in blood in a greater or less degree with the native red races, hybridity had resulted on a great scale. The process had already been developed sufficiently long to afford important indications of the evolutions of permanent hybrid varieties. A specimen is to be seen among the tribes of the half-breeds in Manitoba, as it were in the process of evolution; while sheltered within the remote Arctic regions man can be studied among the Esquimaux in conditions closely analogous to those which are ascribed to a post-pliocene, if not to a pre-glacial, period. In the abrupt collision of the civilised races of Europe with the American aborigines, it had always been taken for granted that the latter were doomed to inevitable extinction, and that the land would be peopled with the purely civilised races of the world. There is no question, however, that from an early date there have been intermarriages between European and American races. A growing feeling is manifesting itself in the United States and Canada that the Indian population is not doomed to extinction, that a much larger amount of healthy intermarrying and consequent absorption has existed than unobserving critics had any conception of, and that the native Indian element is a factor in the population of the New World destined to exercise an enduring influence on the ethnical character of the Euro-American races.

GEOGRAPHICAL SOCIETY.

Nov. 25th.—Major-General Sir H. C. Rawlinson, V.P., in the chair.—The following gentlemen were elected Fellows: Sir J. Coode, Sir C. Harvey, Bart., Lieut.-General Sir D. Lysons, Col. J. T. Norgate, Major-General E. W. Scott, Commander G. C. Musters, Capt. E. J. Church, Capt. A. A. Jopp, Capt. C. E. Pryce, Lieut. W. H. Turton, Lieut. J. L. Heane, Rev. J. P. Farler, Rev. A. H. Gell, Rev. F. C. Lambert, Rev. C. Perry, Rev. W. Potter, Messrs. E. L. Brandreth, F. Burt, J. Bussell, R. A. Cameron, W. Collins, J. R. Deane, J. Dixon, jun., T. W. Druitt, P. Ellis, D. Hickie, S. T. Hill, G. Johnson, J. J. Jones, R. B. Joyner, G. Kilgour, T. Kilham, J. L'Aker, C. H. Lepper, A. Lloyd, J. V. Milne, L. M'Kenna, A. H. H. Murray, P. Nightingale, J. Norris, J. Poland, F. Powell, J. Robinson, V. J. Robinson, A. G. Schiff, A. Simson, C. J. Stock, C. P. Taylor, and E. S. Thomasson. The paper read was "On Usambara, East Africa, and the adjoining Country." by the Rev. J. P. Farler.

GEOLOGICAL SOCIETY.

Nov. 20th.—E. Etheridge, Esq., V.P., in the chair.—Rev. J. Compton and Mr. J. D. Paul were elected Fellows. The following communications were read: "On the Upper-Greensand Coral Fauna of Haldon, Devonshire," by Prof. P. M. Duncan; "Notes on *Pleurodon affinis*, sp. ined., Agassiz," and "Description of three Spines of Cestracionts from the Lower Coal Measures," by Mr. J. W. Davis; and "On the Distribution of Boulders by other Agencies than that of Icebergs," by Mr. C. E. Austin.

SOCIETY OF BIBLICAL ARCHÆOLOGY.

Nov. 20th.—Mr. T. Morgan in the chair.—It was announced that the memorial of the Council to the Corporation of South Shields for the preservation of the Roman station recently excavated at the Lawes had resulted in securing the safety of the remains. The Ecclesiastical Commission had given a part of the freehold site, and the Town Council had voted funds for enclosing the land thus acquired by the town. Mr. E. Way exhibited some interesting London antiquities, and Mr. Roofe described a perfect Amphora without handles found in Queen Victoria-street. Mr. Bowman forwarded a grant of Cecilia Pollard, of Bristol, early fourteenth century, of two shillings yearly for the supply of oil to the lamps of St. Lawrence, Bristol. The Rev. S. M. Mayhew described a large club of limestone found by him in an early British camp in North Wales, and which had evidently undergone the action of fire. Mr. L. Brock produced some perfect Samian ware vessels from Whitstable, and described the locality. Mr. R. Blair reported the discovery on the site of what is probably the cemetery of the Roman station, South Shields, and Mr. De Gray Birch described the peculiarities of the Latin inscription. Mr. G. G. Adams, and the Rev. C. Collier reported the discovery of a third Roman pavement in perfect state at Ilchen Abbas. The proceedings were brought to a close by a paper, by the Rev. S. M. Mayhew, who described the antiquities of Welborne, Lincolnshire.

Dec. 3rd.—S. Birch, Esq., president, in the chair.—Thirty-two new members were elected. Mr. T. G. Pinches read a paper entitled "A new Fragment of the History of Nebuchadnezzar III.,"—and the Rev. A. Löwy read a communication from Prof. W. Wright, entitled "Notes on a Bilingual Inscription in Latin and Aramaic recently found at South Shields."

NUMISMATIC SOCIETY.

Nov. 21st.—J. Evans, President, in the chair.—Messrs. F. J. M'Intyre and C. J. Rodgers were elected members. Mr. Copp exhibited a pattern set of the copper money of George the Third, comprising two unpublished specimens, also pattern halfpennies in silver and copper of William and Mary. Mr. Copp also exhibited two specimens of the false ten shilling piece of Charles the First, with the view of Oxford under the horse, from the same die as the one lately published by the Rev. Mr. G. J. Chester and accepted by him as authentic. Mr. Hoblyn exhibited a pattern rupee of William the Fourth dated 1834, the obverse being from the puncheon of the shilling; and Mr. Evans a gold coin of Filippo Maria Visconti. Duke of Milan and Lord of Anghiari. Mr. Keary, in continuation of a discussion adjourned from the last meeting, argued that the Saxon silver sceattas were imitated from the silver money of Carausius, issued for the use of the Saxon colonists in this island, a theory which was controverted by Mr. Evans, who maintained that they were copied from the copper money circulating in Britain at the time of their first issue. Mr. P. Gardner read a paper in which he proposed reattribution of certain Greek coins. Mr. B. V. Read a paper on Himyarite and other early Arabian imitations of the coins of Athens, and exhibited a selection from a hoard lately found at San'â, near Aden, consisting of about 300 Himyarite coins bearing inscriptions in the Himyarite character. Col. Prideaux made some remarks on the interpretation of the inscriptions, which he supposed to contain the names of several hitherto unknown kings of Yemen and Hadhramaut.

CHEMICAL SOCIETY.

Nov. 12th.—This was a special meeting to hear the Faraday Lecture, which was delivered in the theatre of the Royal Institution by Prof. A. Wurtz, and was entitled "La Constitution de la Matière à l'Etat Gazeux."

Nov. 21st.—R. Warington, Esq., in the chair.—The following papers were read: "A Chemical Study of Vegetable Albinism," by Prof. Church. The author has made numerous analyses of white and green leaves of the same age from the same plant, in order to discover whether any difference in their composition could be detected. The leaves were gathered from the maple, the holly, the ivy, and three exotic plants. White leaves contain more water than corresponding green leaves, whilst the ash of white leaves contain more potash and phosphoric acid, but less lime, and especially less oxalate and carbonate of calcium. Nearly sixty per cent, of the nitrogen in the white leaves is non-albumenoid, while the green leaves contain thirty per cent. of nitrogen in that state. The author has also analysed a vegetable parasite, the dodder, and its host, the red clover. He finds that the whites leaves resemble in composition the parasite, while the host represents the great leaves. The white leaf is, therefore, in a sense a parasite on the green leaf, and owes its existence to its connection with the normal portion of the plant. "Relation between the Melting Points of the Elements and their Co-efficients of Expansion," by Dr. Carnelly. The author finds that of thirty-one elements twenty-six show that the co-efficient of expansion increases as the melting point diminishes; the five exceptions are arsenic, antimony, bismuth, tellurium, and tin. "A Preliminary Notice on a Hydride of Boron," by Mr. A. F. Jones. The author succeeded in preparing a grey friable mass of magnesium boride by strongly heating a mixture of magnesium dust and boron trioxide. On treating this mass with hydrochloric acid a colourless gas was evolved, spontaneously inflammable, burning with a green flame, and of disagreeable odour.

PHOTOGRAPHIC SOCIETY.

Nov. 12th.—J. Glaisher, Esq., in the chair. The medals awarded for the best pictures in the Photographic Exhibition having been presented, a paper by Mr. L. Warnerke was read, "Photographic Notes from a Travel in Russia," with exhibition of various works, apparatus, and materials, after which Mr. J. Thomson gave a brief *résumé* of his photographic experience in Cyprus.

METEOROLOGICAL SOCIETY.

Nov. 20th.—Mr. C. Greaves, President, in the chair.—Rev. T. L. Almond, Rev. T. C Beasley, Lieut.-Col. W. Stuart, Messrs. F.. T. Bircham, H. F. Blandford, G. Chatterton. E. Easton, W. L. Fox, G. F. Lyster, R, Tennent, and H. Youl were elected Fellows. The following papers were read: "Report on the Phenological Observations for 1878, by the Rev. T. A. Preston; "Up-Bank Thaws," by the Rev. W. Stow; and "Comparison of Thermometric Observations made on board Ship," by Capt. H. Toynbee.

MICROSCOPICAL SOCIETY.

Nov. 13th—H. J. Slack, Esq., President, in the chair.—Three new Fellows were elected. A paper was read by Dr. G. W. Royston-Pigott, "On some further Inquiry into the Limits of Microscopic Vision, and the Delusive Application of Fraunhofer's Optical Law of Vision," in the course of which he described numerous experiments to show that this well-known formula depended upon the laws of diffraction from rays reflected by bright dics or objects, but that it failed when applied to dark lines, which were capable of being rendered visible far beyond the limits therein laid down. The President detailed the result of some recent experiments to determine the distances at which a human hair could be seen under various conditions by ordinary unassisted vision. Mr. F. H. Wenham read a paper "On the Measurement of the Angle of Aperture of Objectives," in which he described the method of measuring the true angle of aperture as distinguished from that of the angle of field with which it was commonly confused. Mr. H. Davis read a paper "On the Pygidium in Insects," showing that the organ commonly known by this name had its representatives in the Neuroptera, Gryllidæ, and other groups of insects, as well as in the flea and the lace-winged fly. He gave reasons for regarding it as a special organ of sensation, conveying to the insect an intimation of the presence of dangerous enemies. A discussion took place between Mr. C. Stewart, Mr.

Beck, Mr. Slack, and the author of the paper. Some further communications arising out of correspondence with Mr. Bedwell were laid before the meeting by the Secretaries.

LINNEAN SOCIETY.

Nov. 21st.—Dr. Gwyn Jeffreys, V.P., in the chair.—Messrs. T. Davidson and F. J. Faraday were elected Fellows. Dr. W. P. Kesteven exhibited and a note was read on specimens of so-called "*Tete Anglais*," from Vieuxfort, St. Lucia. There was also exhibited roots, tendrils, and tubers in different stages, of *Vitis gongylodes* and *V. cuspidata*, illustrating the paper immediately thereafter read, viz., "On Branch Tubers and Tendrils of *V. gongylodes*," by Mr. R. I. Lynch. Subrerranean tubers are by no means uncommon among plants, *e. g.*, the potato; but in contrast those of *V. gongylodes* present on the stem are aerial, at a height, and on dropping to the ground strike root. Cylindrical, of considerable size and tenacious of life, they doubtless are a safegard in propagation of the plant in seasons of drought and such like. The tendrils possess terminal adhesive discs, and are formed without the stimulus of contact with any substance, therefore opposed to certain other climbers mentioned by Mr. C. Darwin. The aerial roots are of great length, eleven feet and more, spring from each node, and are of a rich crimson hue in summer, so that they are attractive objects, as seen in the Victoria house at Kew. "Report on the Mollusca of the Challenger Expedition," by the Rev. R. B. Watson. After introductory remarks, the author describes three genera of the Solenoconchia. Of these, Dentalium has eighteen species, eleven being new. Siphodentalium has seven species, all new to science. Of Cadulus, two only are already known, nine species and one variety being now recorded for the first time. In all, thirty-six species and four varieties, whereof twenty species were hitherto unknown. Some are of high interest as remnants of genera now living which have existed since the Cretaceous epoch. The Secretary read the abstract of a paper by Mr. J. Miers, "On the Symplocaceæ." The author gave a synopsis, to him, eleven recognizable genera, with diagnoses of same and lists of 125 species. "On the Algæ of Lake Nyassa," by Prof. Dickie.

ZOOLOGICAL SOCIETY.

Nov. 19th.—A. Grote, Esq., V.P., in the chair.—Mr. Sclater exhibited and made remarks on an adult specimen, in full plumage, of the black-throated Stonechat (*Saxicola stapazina*), from Lancashire. The species had not been previously recorded as occurring in the British Isles. Letters and papers were read: from Dr. A. B. Meyer and Mr. A. D. Bartlett in reference to Mr. Everett's communication respecting the supposed existence of the Anoa (*Anoä depressicornis*) in the Philippines; by Prof. Owen, on the relative positions to their constructors of the chambered shells of Cephalopods; by Sir V. Brooke, "On the Classification of the Cervidæ," and on a new species of Gazelle from Eastern Africa, which he proposed to name *Gazella Walleri*, after its discoverer, Mr. G. Waller; by Prof. A. H. Garrod, "On the Anatomy of *Indicator major*;" from the Marquis of Tweeddale, containing the eleventh of his contributions to the Ornithology of the Philippines, and describing the collection made by Mr. A. H. Everett at Zamboanga, in the island of Mindando; and by Mr. E. R. Alston, notes supplementary to his paper "On the Squirrels of the Neotropical Region."

ROYAL SOCIETY OF LITERATURE.

Nov. 27th.—Sir P. de Colquhoun, V.P., in the chair.—Mr. C. F. Keary read a paper "On the Earthly Paradise of European Mythology," in which he showed, from the Middle Age legends, the evidence of a current of tradition concerning the earthly paradise, distinct from, and sometimes opposed to, the doctrines of orthodox Catholicism, and, therefore, a survival from heathen mythology. The peculiar features of the non-Christian legend pointed to an earthly paradise lying in the West, and only to be reached after a passage over the sea. Mr. Keary then proceeded to trace this belief among the chief European mythologies, and contended that a myth which once referred to the journey of the soul after death, coming in time to be treated in a more literal, and, in some sense, more prosaic manner, gave rise to the story of an earthly paradise. The earlier myth of the soul's journey probably took a definite shape before the ancestors of the European races had migrated from their early home in Asia.

INSTITUTION OF CIVIL ENGINEERS

Dec. 3rd.—Mr. Abernethy, V.P., in the chair.—Twelve members were elected, viz.: Messrs. W. Baxter, L. Clark, G. C. Cunningham, G. E. Gray, Jacob Higson, John Higson, W. Russ, A. Penny, jun., J. R. Rees, A. Macnab, W. H. Stubbs, and J. Swinburn. A paper was read "On the Heating and Ventilating Apparatus of the Glasgow University," by Mr. W. W. Phipson.

ROYAL INSTITUTION.

Dec. 2nd.—G. Busk, Esq., treasurer and vice-president, in the chair.—Dowager Lady Stanley of Alderley, Viscount Bangor, Dr. P. Black, Capt. R. Goff, and Mr. J. T. Rogers were elected members. It was proposed that a subscription be opened by the members for the purpose of presenting to the institution a bust of Mr. W. Spottiswoode, the newly-elected president of the Royal Society, in recognition of his valuable services as treasurer and subsequently as secretary, on the occasion of his resigning that office.

SOCIETY OF ARTS.

Dec. 4th.—Dr. C. W. Siemens in the chair. A paper "On Electric Lighting" was read by Mr. J. N. Shoolbred, and illustrations given by the inventors of the various electric lamps exhibited.

SOCIETY OF ENGINEERS.

Dec. 2nd.—Mr. R. P. Spice, president, in the chair.—A paper, by Mr. J. Atkinson, "On Apparatus for Utilising the Waste Heat of Exhaust Steam," was read.

PATENT LAW AMENDMENT ACT.

Mr. Anderson, M.P. for Glasgow, has reintroduced his Patent Law Amendment Bill of last Session. It is in substance the same as the former one, but differs as regards the scale of payments for patents, inasmuch as by the new Bill, the two first stages, *i.e.*, petition and notice to proceed, are £1 5s. each, instead of £2 10s. as in the former Bill.

THE fifty-sixth session of the Birkbeck Literary and Scientific Institution, Southampton Buildings, Chancery Lane, has just commenced. The evening classes, which are open to ladies and gentlemen, include English, French, German, Italian, Spanish, Portuguese, Latin, Greek, mathematics, arithmetic, book-keeping, natural and mechanical science, logic, political economy, law, literature, history, geography, shorthand, drawing, painting, music, &c., &c. Some indication of the work carried on by this institution will be gathered from the fact that one hundred classes meet weekly in the various subjects. To meet the demand for more space a new laboratory has been erected during the recess, and practical instruction will be given both in organic and inorganic chemistry.

HALCYON DAYS.

THE gods in dreams conveyed to Halcyone's ears
The fate of Ceyx, her husband, and on the morrow,
Finding his dead body on the shore (wild with grief.
And in the bitterness of new-made widowhood),
She cast herself into the foaming waves.
From thence arose two plumed birds, to which
They twain were changed; which built their nest,
And reared their young, upon the water's surface,
Whilst keeping calm the troublous seas meanwhile.

. . . . .

Such, says the legend, was the first existence
Of the Kingfisher, bird of plumage gay,
And still their offspring hover o'er the waters,
And spend their life as one long summer day.
Fit, then, it is their name should be synonymous
With all that's calm and peaceful, bright and joyous.

Our childhood yields us days of purest pleasure,
Whereon no care can linger, no blight chill;
Glad hours are youth's, full of ambitious yearnings,
And age, with hopes accomplished, placid, still,
If life be rightly used, like the gay Halcyon's nest,
Our bark shall bound upon the world waves' crest.

ETOILE.

Vide "Lemprière," "Montaigne," Goldsmith's "Natural History," &c., &c.

CARTER'S PATENT VENTILATED PACKING CASE.

THE object of the patent ventilated packing case, is to allow the highly heated condensed air and moisture, formed in air-tight and tin-lined cases, to escape, and yet to prevent the contents from sustaining damage from sea or bilge water. Very little reflection will shew that the change from an average mean temperature of say 60° Fahrenheit, at which the goods have been packed and soldered up, to the heat of a vessel's hold, which in many instances exceeds 120°, or double the heat at which they have been packed, must expand the air in the case, cause the contents to sweat, and, as this moisture, &c., cannot escape, fungoid growth, in the form of mould, to be rapidly developed, to the great injury of the contents. The advantages claimed for this case, in addition to greatly preventing these evils, are: 1st. That when the case is sawn asunder, on reaching its destination, each compartment will form a separate case, and thus cases, too large as a whole for ordinary use, can afterwards be utilized. 2nd. Smaller consignments can be sent in compartments forming one case, at tonnage freightage instead of parcel rate, thus effecting a great saving in the cost of transit, bills of lading, shipping charges, &c. 3rd. The partitions materially strengthen the case, thereby preventing the danger of breakages, and enabling the contents to be firmly packed. 4th. That one or more of the compartments can be hermetically closed, and the other or others, in one and the same case, ventilated. And, lastly, the expense is slight in all cases; and in many instances these results are obtained at an ultimate saving of cost. As the battens and partitions will of themselves strengthen the case, the cost of the adoption of this principle may be saved or greatly reduced by the use of a thinner board. The inventor and patentee is Mr. W. Carter, Masham, Yorkshire.

Correspondence.

THE ELECTRIC LIGHT.

TO THE EDITOR OF THE SCIENTIFIC AND LITERARY REVIEW.

SIR,—Many years since, though but a tyro in electricity, I ventured to predict in the presence of a professor of the science, that it would eventually become the *light* and *motive power* of the world, which brought upon me some ridicule at the time. The first part of my prophecy is now becoming true, and the latter, it would, appear is on the eve of advancement through the inventive genius of Miss Harriet Hosmer. I would now venture further, by anticipating our *heat* from the same source. I see no reason why a stove filled with a preparation of asbestos, amianthus, or some variety of the hornblende family, should not, with the aid of electricity, form a perpetual and indestructible fire. We have already examples on the Continent of *time* being laid on by electricity, and our *light, heat,* and *motive power* may all be eventually produced from the same source.—I am, Sir, your obedient servant,

HENRY GEORGE HELLIER.

COSSLETT'S IMPROVED BOILER.

THIS boiler consists of several or many tubes, arranged vertically or diagonally, or at any suitable angle as may be desired with circulating division tubes, connecting tubes or pipes and cross tubes or pipes, at or near the top and bottom of the vertical or diagonal steam generating tubes or boilers, same to be so arranged that each generating tube may have an independent water feed, water capacity, circulation, steam space, and steam exhaust. The fire heat, hot air, and smoke pass between and around the tubes. Partitions are to be placed between and across the tubes to direct and distribute the fire heat, hot air, and smoke among, around, and between them. The fire heat, hot air, and smoke to be confined to the surface of tubes a few inches below the water line, and a little distance, say a few inches, above the bottom of the steam generating tubes, so that the tubes may not be burned nor the circulation interfered with. The exhaust from a high pressure engine, or a blower when a condensing engine is used, may be employed to increase the draught up the chimneys and to force a portion of hot air out of the flue or from hollow casing around the flues and boiler into the fire box to obtain increased combustion on top of the fuel. The feed water pipes or tubes at the bottom, and steam pipes or tubes at the top, of the steam generating tubes should be connected with screwed pipe connections and lock nuts and other suitable devices, so that each tube or pipe may be removed and replaced easily and readily. The connections at the top of the steam generating tubes should be made with screwed pipes and lock nuts large enough for the circulating tubes or partitions to be introduced inside, taken out, and replaced as desired. The fuel may be fed from the sides or ends of the fire-place, and forced forward as required by a poker, or by other mechanical devices. Part of the fire-grate perforations may be covered with a damper at the feed entrance to assist combustion on the top of the fuel, aided by a blower of hot air out of the flue or hot air from casing around flues and boiler. A portion of the boiler may be used as a feed water heater by introducing connections between alternate heating tubes (or steam generating tubes) at some distance below their water line and at the bottom, so that the cold feed water may travel through the heating tubes towards the steam generating tubes. The steam spaces and exhaust at the top convey away any steam generated. Various shapes, modes, or principles of connections may be used for the various tubes of the boiler and feed water heater; and the circulation division tubes may be left in or removed as desired.

REMOVAL OF THE ENTIRE SCALP BY MACHINERY.

The *Scientific American* inserts the following in its issue of 30th November, 1879 :—

At a recent meeting of the New York Pathological Society, reported in the *New York Medical Journal*, Dr. Finnel presented, on behalf of a candidate, the entire scalp of a woman twenty-eight years of age. While visiting an oleomargarine factory, she stooped down to examine some of the processes. Behind her head was a revolving shaft, and in some manner her long hair became wound round the shaft. The rapidity of the shaft was such that the whole scalp was drawn off without giving sufficient pain to draw her attention to the condition of her head. The first sensation she experienced was coldness of the head, and on putting up her hand she found that her hair was gone. Following the injury there was no shock and no pain. On examining the head the denuded surface was seen to extend from the base of the occiput to the left eyebrow. The eyebrow was gone, and the left ear was so much injured as to hang down by a strip of skin.

The scalp measured twenty-four inches in circumference, and was attached to the hair thirty-two inches long. It was at first proposed to apply the scalp, but on examining there was noticed such an amount of grease adhering to the raw surface that any effort at union was thought to be useless.

Dr. Finnel said it was his intention to tan the scalp, and thus allow the patient to use her natural hair, but not in the usual way.

Dr. Abbe referred to a similar case which occurred four years ago, and was under treatment in St. Luke's Hospital. The amount of scalp removed was nearly identical with that presented, and the manner in which it was done was similar. Three months after the injury, granulation extended over the denuded cranium. It was found, in the use of grafts, that those only were successful that were placed within an inch from the cicatricial margins. The grafts were the size of canary seed, and, during the four years that the process of catrization continued, about twelve thousand were used.

Dr. J. C. Peters referred to the case of a waiter at a club house, who was scalped by a falling mirror. The scalp was separated into two flaps, which were attached at their base. These were brought into position, and within a few days union took place.

TECHNOLOGICAL MUSEUM FOR SYDNEY, NEW SOUTH WALES.—We are informed that the Government of New South Wales has requested Mr. William Forster, agent-general for the colony, Prof. Liversidge, of the University of Sydney, and Mr. E. Combes, M.P., C.M.G., to collect information in the United Kingdom and on the Continent relative to the working of English and foreign technological museums and colleges, with a view to forming similar institutions in Sydney. A sum of money has been placed on the estimates by the Government of the colony, to enable the committee to purchase suitable specimens. We have no doubt that the agent-general for New South Wales (3, Westminster Chambers, S.W.) will be extremely glad to receive from such institutions, or from any other source, reports or any information which would assist the committee in its inquiries.

An improved reciprocating churn has been patented by Mr. James E. Gibbs, of Scottsborough, Ala. This churn has a double dasher, that is reciprocated by means of an eliptical cam secured to the fly wheel of the driving apparatus.

RECENT AMERICAN PATENTS.

An improvement in insulating railroad tracks has been patented by Mr. Louis Bastet, of Brooklyn, N. Y. The object of this invention is to insulate the rails of railroads from the structure upon which they rest, so that the vibrations caused by passing trains will not be communicated to the supporting structure, so as to be diffused.

Mr. Francis J. Hanna, of Kane City, P.A, has patented an improved oil well pump, having a tubular piston, open at each end, and provided with a ball valve at the top, and connected by a centrally open coupling with tubular piston rod, the whole being arranged to operate in a pump barrel that is perforated at its upper end.

An improved locomotive has been patented by Mr. Jacob J. Anthony, of Sharon Springs, N. Y. It consists in a rectangular water tank, and constructed with a recess to receive the cranks and connecting rods of the locomotive.

M. Seth Kethledge, of Center Point, Iowa, has patented an improved lumber measure, in which the motion of the spur wheel or tooth disks is transmitted to an indicator which has a reciprocating rectilinear motion longitudinally of the carrying frame or case. No adjustment is required for the purpose of measuring boards of different widths. Instead of a circular dial there is a scale marked with figures arranged in columns extending longitudinally on the surface of the carrying frame or case, and a separate column is provided for each of the different standard lengths of lumber.

Mr. Thomas N. Jordan, of Mobile, Alabama, has patented an improved machine for holding and guiding the file in filing, so that a saw may be filed with accuracy and dispatch, even if the operator is unskilled.

Mr. James L. Carpenter, of Vineland, N. J., has patented an improved device for feeding young pigs, goats, lambs, and calves. It consists in the compination, with a box or pen, of a receptacle for milk or other food, placed upon the outside of the pen, and provided with a series of nipples which project through the side of the pen to its interior. A trough is placed beneath the ends of the nipples to catch the drip and teach the animals to drink.

Mr. Charles Van Houten, of Marion, Ohio, has patented an improved grain binder, which consists in the arrangement of the rake, which is carried by an extensible lever made in the form of the lazy tongs, and pivoted upon an independent horizontal fulcrum, so as to give the rake a compound movement, due partly to the extension and retraction of the same from the movement of the lazy tongs, and partly to the integral oscillation of the lazy tongs upon their outside pivots. It also consists in a peculiar slotted spool for twisting the two ends of wire around the sheaf, and its arrangement with respect to the devices for carrying the wire. The invention also has other features, which cannot properly be described without an engraving.

THE LIGHTING OF RAILWAY CARRIAGES.—The Lancashire and Yorkshire Railway Company have, as we learn from the *Manchester Evening News*, just tried a very successful experiment in the lighting of their coaches. A considerable part of the Southport express, which leaves Victoria Station at 5 p.m., is now lighted with Kelly's Improved Railway Carriage-roof Lamp; so far the experiment has been a decided success. The new lamp gives a light which is at once so steady and brilliant that reading becomes both easy and agreeable, and the comfort of night travelling is vastly increased. Non-explosive petroleum is used, and it is claimed that it is far cheaper, and much safer than other arrangements.

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